2003

Cancer in Iowa

STATE HEALTH REGISTRY OF IOWA

The University of Iowa

In 2003, an estimated 6,400 Iowans will die from cancer, 13 times the number caused by auto fatalities. Cancer is second only to heart disease as a cause of death. These projections are based upon mortality data the State Health Registry of Iowa receives from the Iowa Department of Public Health. The Registry has been recording the occurrence of cancer in Iowa since 1973, and is one of fourteen registries nation-wide providing data to the National Cancer Institute. With *Cancer in Iowa: 2003* the Registry makes a general report to the public on the status of cancer. This report will focus on:

- **a description of the Registry and its goals;**
- **cancer projections for 2003;**
- **a special section on colorectal cancer;**
- **brief summaries of research projects during 2003;**
- **a selected list of publications from 2002.**

Cancer is a reportable disease as stated in the Iowa Administrative Code. Cancer data are collected by the State Health Registry of Iowa, located at The University of Iowa in the College of Public Health's Department of Epidemiology. The staff includes more than 50 people. Half of them, situated throughout the state, regularly visit hospitals, clinics, and medical laboratories in Iowa and neighboring states to collect cancer data. In 2003 data will be collected on an estimated 14,700 new cancers among Iowa residents. A follow-up program tracks more than 97 percent of the cancer survivors diagnosed since 1973. This program provides regular updates for follow-up and survival. The Registry maintains the confidentiality of the patients, physicians, and hospitals providing data.

Since 1973 the Iowa Registry has been funded by the Surveillance, Epidemiology, and End Results (SEER) Program of the National Cancer Institute (NCI). Iowa represents rural and midwestern populations and provides data included in many NCI publications. Beginning in 1990 about 5-10 percent of the Registry's annual operating budget has been provided by the state of Iowa. The Registry also receives funding through grants and contracts with university, state, and national researchers investigating cancer-related topics.

The goals of the Registry are to:

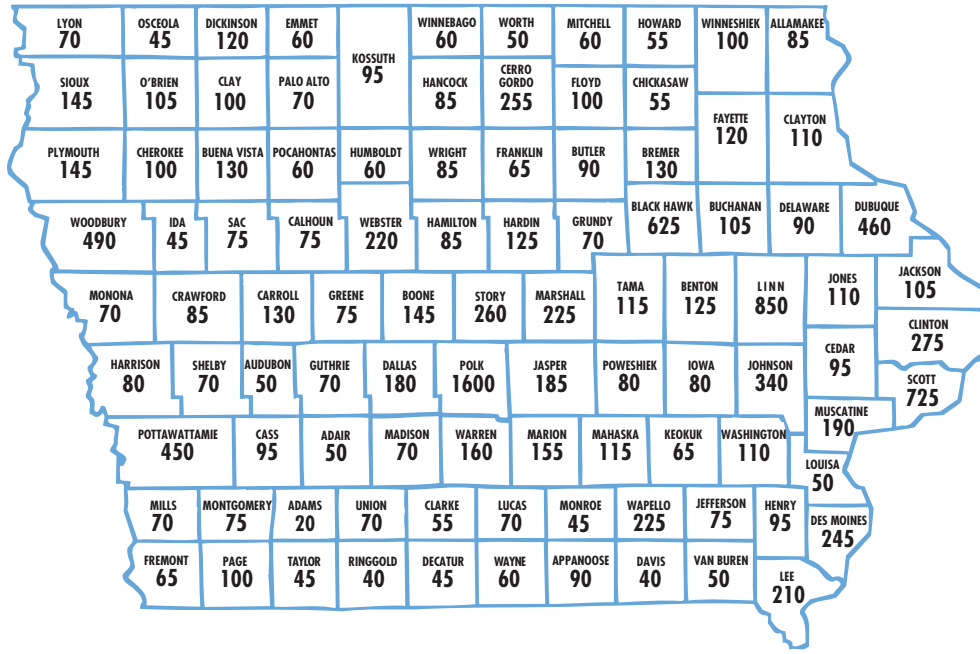
- assemble and report measurements of cancer incidence, survival and mortality among Iowans;
- provide information on changes over time in the extent of disease at diagnosis, therapy, and patient survival;
- promote and conduct studies designed to identify factors relating to cancer etiology, prevention and control;
- respond to requests from individuals and organizations in the state of Iowa for cancer data and analyses;
- provide data and expertise for cancer research activities and educational opportunities.

During 2003, the Registry will respond to 300 requests for data, analyses, and cancer cluster investigations.

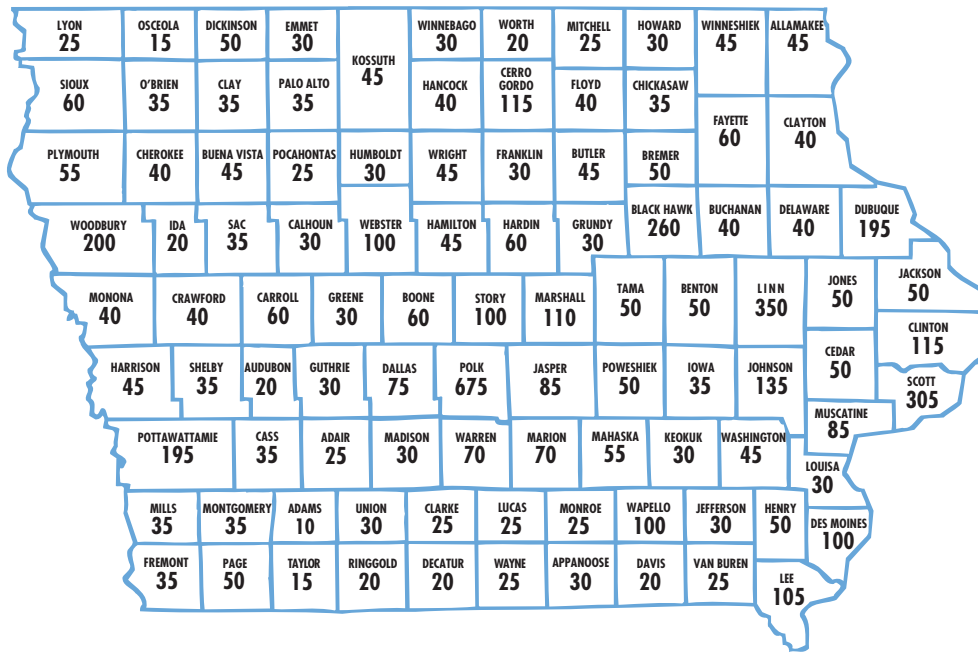
Cancer Projections for 2003

In 2003, cancer will strike five out of every 1,000 Iowans. Cancer is the second leading cause of death in Iowa, responsible for 2 of every 1,000 deaths. Breast, colon & rectum, lung, and prostate cancers will account for more than half of all new cancers and cancer deaths.

Estimated Number of New Cancers in Iowa for 2003



Estimated Number of Cancer Deaths in Iowa for 2003



Top 10 Types of Cancer in Iowa Estimated for 2003

New Cancers in Females

Type	# of Cancers	% of Total
Breast	2200	30.1
Colon & Rectum	1100	15.1
Lung	870	11.9
Uterus	490	6.7
Non-Hodgkin's Lymphoma	300	4.1
Ovary	250	3.4
Skin Melanoma	240	3.3
Leukemia	180	2.5
Kidney & Renal Pelvis	170	2.3
Pancreas	160	2.2
All Others	1340	18.4
Total	7300	

Cancer Deaths in Females

Type	# of Cancers	% of Total
Lung	700	22.6
Breast	450	14.5
Colon & Rectum	390	12.6
Ovary	190	6.1
Pancreas	180	5.8
Non-Hodgkin's Lymphoma	150	4.8
Leukemia	120	3.9
Uterus	80	2.5
Brain	70	2.3
Multiple Myeloma	70	2.3
All Others	700	22.6
Total	3100	

New Cancers in Males

Type	# of Cancers	% of Total
Prostate	2200	29.7
Lung	1200	16.2
Colon & Rectum	1000	13.5
Non-Hodgkin's Lymphoma	300	4.1
Skin Melanoma	280	3.8
Kidney & Renal Pelvis	280	3.8
Bladder	250	3.4
Leukemia	250	3.4
Oral Cavity	180	2.4
Pancreas	180	2.4
All Others	1280	17.3
Total	7400	

Cancer Deaths in Males

Type	# of Cancers	% of Total
Lung	1000	30.3
Prostate	400	12.1
Colon & Rectum	350	10.6
Pancreas	160	4.9
Leukemia	160	4.9
Non-Hodgkin's Lymphoma	150	4.6
Kidney & Renal Pelvis	120	3.6
Esophagus	100	3.0
Brain	90	2.7
Bladder	80	2.4
All Others	690	20.9
Total	3300	

Fortunately for Iowans, the chances of being diagnosed with many types of cancer can be reduced through positive health practices such as smoking cessation, physical exercise and healthful dietary habits. Early detection through self-examination and regular health checkups can improve cancer survival.

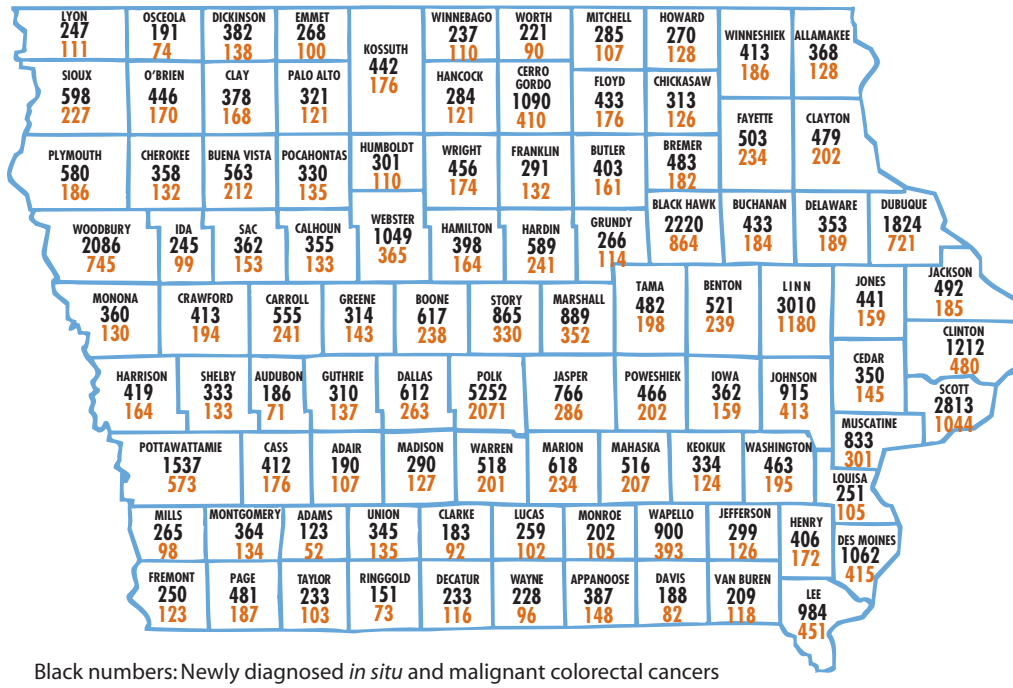
Cancer of the colon and rectum (colorectal cancer) is the third most commonly diagnosed cancer and the second leading cause of cancer deaths each year in Iowa. Between 1973 and 2000, there were 58,783 colorectal cancers diagnosed in Iowa (Figure 1). Of these, 95% were diagnosed in Iowans 50 years of age and older. The number of colorectal cancers has increased during this period from 1,840 per year in the 1970s, to 2,180 in the 1980s, to 2,200 per year in the 1990s.

There were 23,527 deaths due to colorectal cancer in Iowa for the years 1973-2000 (Figure 1). Deaths due to colorectal cancer have declined over this period, from an average of 875 per year in the 1970s and 1980s to 790 in the 1990s. As shown in Figure 2, colorectal cancer mortality rates have been declining in Iowa since 1985 and are approaching the goal set for the year 2010 in the statewide plan to improve the health of Iowans, called *Healthy Iowans 2010*.

One of the keys to reducing death from colorectal cancer is early detection. Staging is done to determine whether the cancer has spread. Early stage colorectal cancers are cancers that are generally confined to the wall of the colon or rectum and have not spread to the regional lymph nodes. As can be seen in Figure 3, during the 1990s, 39 (males) and 37 (females) out of every 100 newly diagnosed colorectal cancers were early stage. This has not changed much since the 1970s where 33 (males) and 31 (females) out of every 100 were early stage.

Figure 1

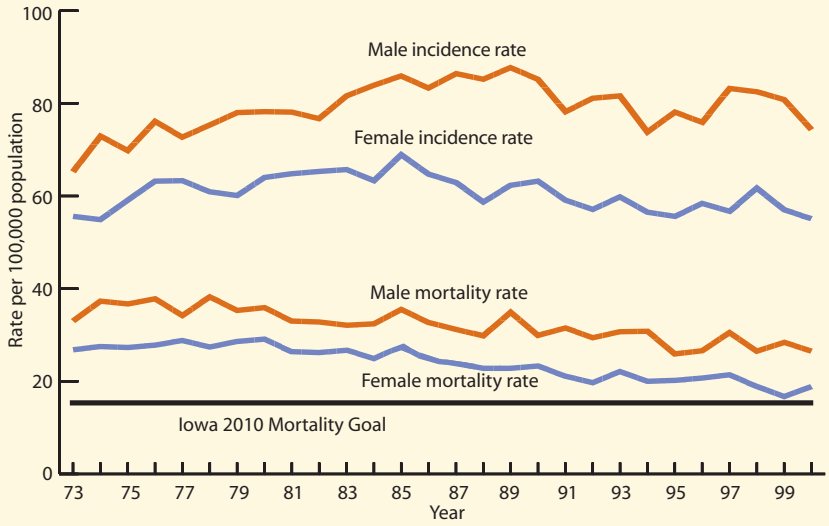
Newly Diagnosed *In Situ* and Malignant Colorectal Cancers and Cancer Deaths
Iowa, 1973-2000



Black numbers: Newly diagnosed *in situ* and malignant colorectal cancers
Orange numbers: Colorectal cancer deaths

Figure 2

Colorectal Cancer Incidence and Mortality Rates*
Iowa, 1973-2000

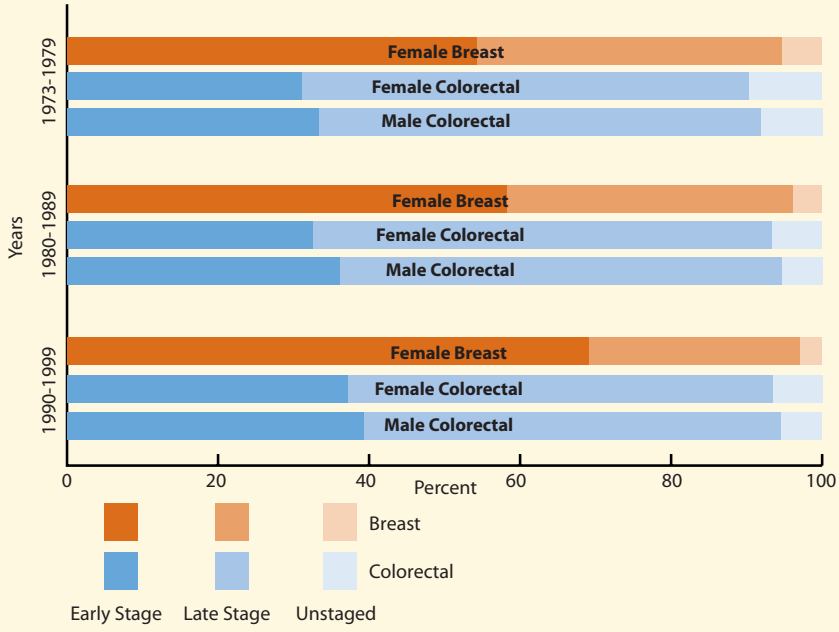


*Rates are age-adjusted to the U.S. 2000 population

The percentage of female and male colorectal cancers diagnosed at an early stage have slowly increased over the last three decades, however they lag far behind the percentage of female breast cancers diagnosed at an early stage.

Figure 3

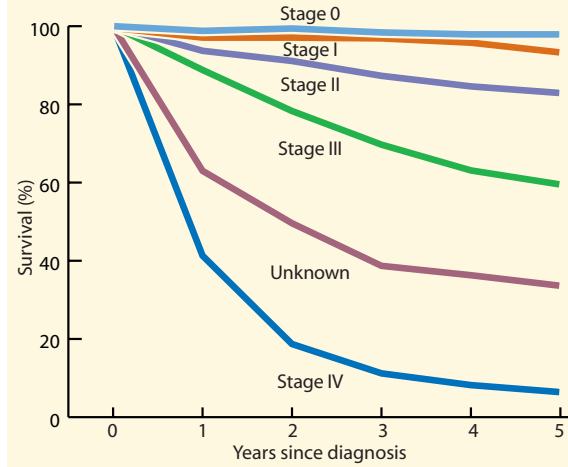
Newly Diagnosed Colorectal Cancers and Female Breast Cancers by Stage
Iowa, 1973-1999



Screening tests can prevent the occurrence of colorectal cancer by detecting and removing adenomatous polyps before they become cancerous, or they can identify cancer at an early stage, resulting in better survival. Figure 4 shows relative survival rates based on a modified version of the American Joint Committee on Cancer's staging classification. Stage 0 tumors do not yet invade the wall of the colon, Stage I tumors invade into or slightly through the wall, and Stage II tumors invade more extensively and may involve adjacent organs. Stage III represents regional lymph node involvement. Stage IV represents distant metastasis, such as spread of the cancer to the liver. The graph shows that as the stage of disease progresses, the survival rates decrease. Five-year survival rates are 98% for Stage 0, 94% for Stage I, and 83% for Stage II. Thereafter, they decrease to 60% for Stage III and 6% for Stage IV disease.

Figure 4

Relative Survival Rates for Colorectal Cancer by SEER Modified AJCC Stage, Iowa 1990-1999



The American Cancer Society recommends that beginning at age 50, both men and women should follow one of these five screening options:

- a fecal occult blood test (FOBT) every year, or *
- flexible sigmoidoscopy every 5 years, or
- a fecal occult blood test every year plus flexible sigmoidoscopy every 5 years, or *

(Of these first three options, the American Cancer Society recommends option 3, i.e., FOBT every year and flexible sigmoidoscopy every 5 years)

- Double-contrast barium enema every 5 to 10 years, or
- Colonoscopy every 10 years

* For FOBT, the take-home multiple sample method should be used.

The large intestine (colon) is about 5-6 feet long and is arbitrarily divided into several contiguous segments. It begins at its connection to the small intestine (ileocecal valve and cecum) in the right lower abdomen, extends upward (ascending colon) to the liver (hepatic flexure), across the upper abdomen (transverse colon) to the spleen (splenic flexure), down the left side of the abdomen (descending colon) to an s-shaped segment (sigmoid) in the pelvis, terminating in the rectum, the final 8-10 inches. The terms "right" and "left" are often used in referring to the colon, the right colon being the portion from the ileocecal valve to the splenic flexure, and the left from the splenic flexure to the rectum. In the 1970's, 36% of colorectal cancers were diagnosed in the right side. In the 1990's, that percentage has increased to 43%. It is not clear if this is due to more effective screening of the right side (colonoscopy allows a view of the entire large intestine whereas sigmoidoscopy reaches only the left side) or if there is a true increase in right-sided cancers.

Despite the benefits and availability of screening, there remain substantial portions of Iowans who have never had a screening exam for colorectal cancer (see Figure 5). This can be seen for both use of the fecal occult blood test as well as a sigmoidoscopy or colonoscopy. As shown in Figure 3,

during the 1990s, 69% of breast cancers were diagnosed at an early stage. This is much higher than the 39% and 37% seen with male and female colorectal cancer, respectively. Mammography is the screening tool available for the early detection of breast cancer. Whereas 13.4% of women 65 years of age and older had not had a mammogram in 1999, 43.2% of Iowans of the same age had not had a fecal occult blood test and 47.1% had not had a sigmoidoscopy or colonoscopy for colorectal cancer.

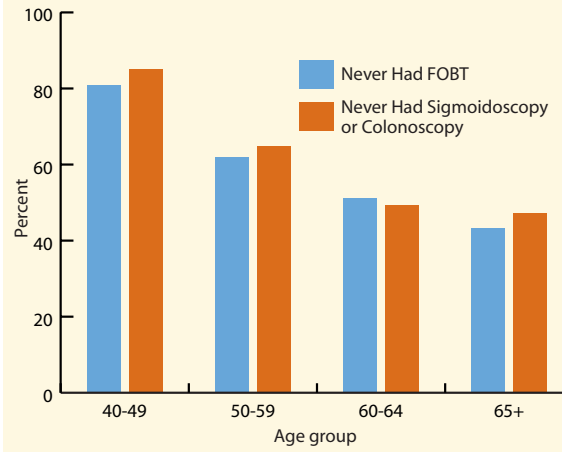
Possible new screening methods are being investigated. These include virtual colonoscopy, a test that uses a Computer Assisted Tomography (CAT) scanner with image processing computers, allowing radiologists to view a 3-D image of the inner surface of the colon. Another method uses stool based DNA testing. Preliminary study findings show that this screening test may spot colon cancers and polyps early enough to make a real impact on survival. The test measures DNA markers from an individual's stool sample that are specific to cancerous and precancerous cells.

Risk factors for colorectal cancer other than age include a strong family history of colorectal cancer or adenomatous polyps in a first-degree relative (in a parent, sibling, or child before age 60 or in two first-degree relatives at any age); a personal history of colorectal cancer, polyps, or chronic inflammatory bowel disease; or a family history of hereditary colorectal cancer syndrome (e.g., familial adenomatous polyposis or hereditary non-polyposis colorectal cancer). Screening should be considered earlier than age 50 for people with any of these risk factors.

Physical inactivity and obesity have been shown to increase one's risk for colorectal cancer. Red meat consumption, smoking, and drinking more than one alcoholic drink per day are also associated with an increased risk of colorectal cancer.

Figure 5

Percent of Population Reporting about Colorectal Cancer Screening, Iowa, 1999



Current American Cancer Society recommendations for nutrition and physical activity relevant to colorectal cancer prevention include:

- Eat a variety of healthful foods, with an emphasis on plant sources.
- Adopt a physically active lifestyle.
- Maintain a healthful weight throughout life.
- If you drink alcoholic beverages, limit consumption.

With increased utilization of the available screening exams for colorectal cancer, we can improve our percentage diagnosed at an early stage, resulting in better treatment options and better survival. The State Health Registry of Iowa has been working with the state of Iowa on a Comprehensive Cancer Control Plan, which addresses colorectal cancer screening issues.

Research Projects During 2003

The State Health Registry of Iowa is participating in over two dozen funded studies during 2003. Brief descriptions of a few of these studies are provided.

THE AGRICULTURAL HEALTH STUDY

The Agricultural Health Study is a long-term study of agricultural exposures and chronic disease (especially cancer) among commercial or private pesticide applicators (and their spouses, if married) in Iowa and North Carolina. The study is funded primarily by the National Cancer Institute. We are in the eleventh year of the study.

In the first five years, 89,658 subjects (58,564 in Iowa and 31,094 in North Carolina) were enrolled in the study. This total for Iowa included 31,877 private applicators, 21,771 spouses of private applicators, and 4,916 commercial applicators. Currently, we are in the second phase of the study, which involves a telephone interview, a mailed dietary questionnaire, and a cheek cell sample. The telephone interview asks about pesticide use since enrollment, current farming and work practices, and health changes. The dietary health questionnaire asks about cooking practices and types of foods eaten. Cooking practices and diet may play a role in cancer and other health conditions. The cheek cells will be used to understand possible links between genetics, exposures, and disease. Since 1997, cohort members have been linked annually to mortality and cancer registry incidence databases in both states. In addition, mortality data on the cohort is being obtained every other year from the National Death Index. More information about recent results from this study, the study background, frequently asked questions, other resources (internet & telephone) for agricultural health information, references for publications to date, and information for scientific collaborators can be found at the website: www.aghealth.org.

BREAST CANCER, RADIATION EXPOSURE, AND GENETIC SUSCEPTIBILITY

The objective of this study is to investigate gene-environment interactions in the etiology of breast cancer. We are establishing a repository of epidemiologic risk factor information and biologic specimens for a targeted goal of 700 women with asynchronous bilateral breast cancer and 1400 women with unilateral breast cancer, who are being ascertained through 5 population-based tumor registries in the U.S. and Denmark, including the Iowa Cancer Registry. All subjects are being interviewed using a structured questionnaire and blood samples are being collected for genetic analyses. Initially, we will examine the interaction of radiation exposure, the ATM gene, and breast cancer. Ionizing radiation is known to be a breast carcinogen and recent studies suggest that the ATM gene may increase susceptibility to radiation-induced breast cancer. Our hypothesis is that women who are ATM gene carriers and who have received radiation therapy as part of breast cancer treatment are at an especially high risk of developing a second primary breast cancer. We will also provide descriptive statistics on the prevalence of ATM in this large population-based sample of women. Thereafter, we will determine the prevalence of BRCA1 and BRCA2 mutations in this population and evaluate interactions between breast cancer, BRCA1/2 and ATM genetic mutations, and radiation exposure. Iowa's goal is to contribute 125 cases and 250 controls.

DATA COLLECTION OF ALL INTRACRANIAL AND CENTRAL NERVOUS SYSTEM (CNS) NEOPLASMS

The primary objective of this study is to evaluate the amount of extra work, quality control, training and resources that will be needed when benign/uncertain behavior brain/CNS tumors are collected routinely for Iowans through the Iowa Cancer Registry. A secondary objective is to obtain laterality information (i.e., right or left side, where applicable) for our malignant and benign/uncertain behavior brain/CNS tumors. Initial results show that meningiomas, pituitary adenomas, and schwannomas will account for the majority of benign brain tumors.

FEASIBILITY OF RETRIEVAL AND STORAGE OF TISSUE BLOCKS FOR CANCER PATIENTS

Researchers affiliated with SEER Registries are increasingly collecting biologic samples from cancer patients. Pathology material should be available retrospectively, but SEER registries are discovering that for an ever-increasing number of cancer patients, the material is being discarded by the originating pathology labs. Thus, this is a real problem that seriously impacts the population representativeness of these studies. The overall goal of this study is to continue an ongoing effort to have greater access to tumor and non-tumor tissue related to the diagnosis and/or treatment of cancer so that there is more representation of the population served by the Registry.

IOWA AND MISSOURI RADON LUNG CANCER STUDIES

This study extends research on cases and controls who are participating in studies of residential radon and lung cancer in Iowa and Missouri. In this study, we are deriving more accurate retrospective radon dose estimates by using a novel retrospective radon progeny-integrating glass-based detector. We are determining whether exposure to residential radon progeny is associated with an increase of lung cancer and whether the shape of the dose-response curve that best describes the relationship between residential radon progeny exposure and lung cancer is linear or nonlinear. Finally, we are evaluating whether exposure to residential radon progeny is associated with specific morphologic types of lung cancer, such as adenocarcinoma.

LUNG CANCER CARE OUTCOMES/SURVEILLANCE CONSORTIUM

This study involves a coordinating center, the Iowa Cancer Registry, and five other primary data collection and research sites across the United States. Across these sites, we will investigate patterns of care for lung cancer, the reasons for particular care decisions by patients and their physicians, variation in dissemination of modern care protocols and practices in different geographic areas, and the effects of these decisions and practices on patient outcomes, including quality of life. In Iowa, we plan to rapidly identify and enroll 1,000 lung cancer patients newly diagnosed over an 18-month period beginning Spring 2003.

OBESITY, RENAL CELL CARCINOMA (RCC) & EXPRESSION OF THE INSULIN-LIKE GROWTH FACTOR-I RECEPTOR

This investigation will be conducted using RCC cases from the Cancer and Drinking Water Contaminants Study, a population-based case-control investigation of six cancer sites previously conducted in Iowa. The goal of this study is to determine whether the association between obesity and development of RCC is dependent on expression of the IGF-I receptor. We are retrieving tumor blocks, where available, for 406 incident RCC cases in Iowa first diagnosed between 1985 and 1987. Diagnostic slides and pathology reports will be reviewed in order to stage and grade the tumors as well as to select appropriate tumor cores from paraffin blocks. Tumor blocks will be processed in the Mayo Tissue Acquisition and Processing Core. We will identify the presence of IGF-I receptor in the tumor tissue using immunohistochemical methods, thus allowing us to estimate the prevalence of IGF-I receptor expression.

EPIDEMIOLOGICAL AND MEDICAL MONITORING PROPOSAL OF FORMER DEPARTMENT OF DEFENSE WORKERS AT THE IOWA ARMY AMMUNITION PLANT IN MIDDLETOWN, IOWA

This study aims to conduct an epidemiologic survey of occupational health outcomes and needs for individuals employed by the Department of Defense contractor, the Iowa Army Ammunition Plant in Middletown, Iowa. The targeted employees worked in conventional weapons manufacture on what was known as Division A, which has been in operation from 1945 to the present. Historical exposure assessment and medical surveillance data are being collected for these employees. The data are also being linked to Iowa death tapes, Iowa drivers' licenses, Medicare files, and the Iowa Cancer Registry incidence database.

COOPERATIVE AGREEMENTS AND OTHER REGISTRIES

The State Health Registry of Iowa maintains cooperative agreements with several hospital cancer registries and other agencies. Some of these include:

- Iowa Department of Public Health
- The University of Iowa
  - Birth Defects Registry of Iowa
  - Center for Health Effects of Environmental Contamination
  - Injury Prevention Research Center
  - Environmental Health Sciences Research Center
  - Iowa Center for Agricultural Safety and Health
  - Prevention Intervention Center
  - Holden Comprehensive Cancer Center
  - Center for Public Health Statistics

IMMUNOGENETIC DETERMINANTS OF NON-HODGKIN'S LYMPHOMA (NHL) SURVIVAL

We propose to systematically test the hypothesis that genes with functional, common variant polymorphisms involved in immune function and regulation are associated with overall survival from NHL. Our specific aims are to evaluate: 1) the association of polymorphisms in selected immune-related genes from four key pathways on NHL survival that include genes encoding inflammatory and regulatory cytokines, Th1/Th2 cytokines, innate immunity, and chemokines; 2) whether any effects are independent of other NHL prognostic factors (such as age and stage) and treatment modality; and 3) whether any effects are specific to diffuse large B-cell lymphoma or the combination of follicular and small lymphocytic lymphoma. To achieve these aims, we will develop a prognostic cohort from 364 HIV-negative NHL patients who participated in the last few years in a population-based case-control study in Iowa.

Selected Publications from 2002 Involving the Iowa Cancer Registry

1. Bernstein JL, Lapinski R, Lynch C, Holford T, Thompson WD. Factors influencing mortality among young women with second primary breast carcinoma. *Cancer* 95(10):2051-2058, 2002.

2. Blair A, Tarone R, Sandler D, Lynch CF, Rowland A, Wintersteen W, Steen WC, Samanic C, Dosemeci M, Alavanja MCR. Reliability of reporting on lifestyle and agricultural factors by a sample of participants in the Agricultural Health Study from Iowa. *Epidemiology* 13:94-99, 2002.

3. Calle EE, Rodriquez C, Jacobs EJ, Almon ML, Chao A, McCullough ML, Feigelson HS, Thun MJ. The American Cancer Society Cancer Prevention Study II Nutrition Cohort. *Cancer* 94:500-511, 2002.

4. Cerhan JR, Janney CA, Vachon CM, Habermann TM, Kay NE, Potter JD, Sellers TA, Folsom AR. Anthropometric characteristics, physical activity, and risk of non-Hodgkin's lymphoma subtypes and B-cell chronic lymphocytic leukemia: a prospective study. *American Journal of Epidemiology* 156:527-535, 2002.

5. Chiu BC-H, Weisenburger DD, Cantor KP, Zahm SH, Holmes FF, Burmeister LF, Blair A. Alcohol consumption, family history of hematolymphoproliferative cancer (HLPC) and the risk of non-Hodgkin's lymphoma in men. *Annals of Epidemiology* 12(5):309-15, 2002 July.

6. Coble J, Hoppin JA, Engel L, Elci CE, Dosemeci M, Lynch CF, Alavanja M. Prevalence of exposure to solvents, metals, grain dust and other hazards among farmers in the Agricultural Health Study. *Journal of Exposure Analysis and Environmental Epidemiology* 12(6):418-426, 2002.

7. Comprehensive Cancer Control Study Committee. The face of cancer in Iowa. Iowa Department of Public Health, January 2002, 44 pp.

8. Dennis LK, Lynch CF, Torner JC. Epidemiological association between prostatitis and prostate cancer. *Urology* 60:78-83, 2002.

9. Dores GM, Metayer C, Curtis RE, Lynch CF, Clarke EA, Glimelius B, Storm H, Pukkala E, van Leeuwen FE, Holowaty EJ, Andersson M, Wiklund T, Joensuu T, van't Veer MR, Stovall M, Gospodarowicz M, Travis LB. Second malignant neoplasms among long-term survivors of Hodgkin's disease: a population-based evaluation over 25 years. *Journal of Clinical Oncology* 20:3484-3494, 2002.

10. Engel LS, Rothman N, Knott C, Lynch CF, Logsden-Sackett N, Tarone RE, Alavanja MC. Factors associated with refusal to provide a buccal cell sample in the Agricultural Health Study. *Cancer Epidemiology, Biomarkers & Prevention* 11:493-496, 2002.

11. Field RW, Smith BJ, Steck DJ, Lynch CF. Residential radon exposure and lung cancer: variation in risk estimates using alternative exposure scenarios. *Journal of Exposure Analysis and Environmental Epidemiology* 12: 197-203, 2002.

12. Flood A, Velie EM, Chaterjee N, Subar AF, Thompson FE, Lacey JV Jr, Schairer C, Troisi R, Schatzkin A. Fruit and vegetable intakes and the risk of colorectal cancer in the Breast Cancer Detection Demonstration Project follow-up cohort. *American Journal of Clinical Nutrition* 75(5):936-943, 2002.

13. Harlan LC, Abrams J, Warren JL, Clegg L, Stevens J, Ballard-Barbash R. Adjuvant therapy for breast cancer: practice patterns of community physicians. *Journal of Clinical Oncology* 20:1809-817, 2002.

14. Leonard DG, Travis LB, Addya K, Dores GM, Holowaty EJ, Bergfeldt K, Malkin D, Kohler BA, Lynch CF, Wiklund T, Stovall M, Hall P, Pukkala E, Slater DJ, Felix CA. p53 mutations in leukemia and myelodysplastic syndrome after ovarian cancer. *Clinical Cancer Research* 8:973-985, 2002.

15. Mariotto A, Feuer EJ, Harlan LC, Wun LM, Johnson KA, Abrams J. Trends in youth of adjuvant multi-agent chemotherapy and tamoxifen for breast cancer in the United States: 1975-1999. *Journal of the National Cancer Institute* 94:1626-1634, 2002.

16. Olson JE, Cerhan JR, Janney CA, Anderson KE, Vachon CM, Sellers TA. Postmenopausal cancer risk after self-reported endometriosis diagnosis in the Iowa Women's Health Study. *Cancer* 94(5):1612-1618, 2002.

17. Parker AS, Cerhan JR, Lynch CF, Ershow AG, Cantor KP. Gender, alcohol consumption and renal cell carcinoma. *American Journal of Epidemiology* 155:455-462, 2002.

18. Potosky AL, Harlan LC, Kaplan RS, Johnson KA, Lynch CF. Age, sex, and racial differences in the use of standard adjuvant therapy for colorectal cancer. *Journal of Clinical Oncology* 20:1192-1202, 2002.

19. Schroeder JC, Olshan AF, Baric R, Dent GA, Weinberg CR, Yount B, Cerhan JR, Lynch CF, Schuman LM, Tolbert PE, Rothman N, Cantor KP, Blair A. A case-control study of tobacco use and other non-occupational risk factors for t(14;18) non-Hodgkin's lymphoma (United States). *Cancer Causes and Control* 13:159-168, 2002.

20. Sprince NL, Park H, Zwerling C, Lynch CF, Whitten PA, Thu K, Burmeister LF, Alavanja MC. Risk factors for machinery-related injury among Iowa farmers: a case-control study nested in the Agricultural Health Study. *International Journal of Occupational and Environmental Health* 8(4):332-338, 2002.

21. Travis LB, Gospodarowicz M, Curtis RE, Clarke E, Andersson M, Glimelius B, Joensuu T, Lynch CF, van Leeuwen FE, Holowaty E, Storm H, Glimelius I, Pukkala E, Stovall M, Fraumeni JF, Boice JD Jr, Gilbert ES. Lung cancer following chemotherapy and radiotherapy for Hodgkin's disease. *Journal of the National Cancer Institute* 94:182-192, 2002.

22. Warren JL, Klabunde CN, Schrag D, Bach PB, Riley GF. Overview of the SEER-Medicare data: content, research applications, and generalizability to the United States elderly population. *Medical Care* 40(8)Suppl:IV-3 - IV-18, 2002.

For more information on cancer in Iowa, and for current Registry publications, contact:

Director
State Health Registry of Iowa
The University of Iowa
250 FB Building
Iowa City, IA 52242-2001

319-335-8609

www.public-health.uiowa.edu/shri

Prepared by:

Michele M. West, Ph.D.
Coordinator for Special Projects

Charles F. Lynch, M.D., Ph.D.
Principal Investigator

Kathleen M. McKeen
Director

Daniel B. Olson
Carla J. Van Hoesen
Diana M. Wagner
Programmers

Special thanks to the staff of the State Health Registry of Iowa. We appreciate the generous assistance of physicians and other health care personnel serving Iowans.

The State Health Registry of Iowa is funded by:

- The State of Iowa through a Special Appropriation to the Board of Regents *and*
- The Division of Cancer Control and Population Sciences, National Cancer Institute, Department of Health and Human Services, Contract No. NO1-PC-67008

Published February 2003

36872/2-03

UI College of
Public Health